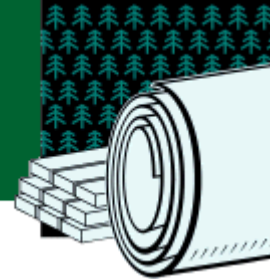


FOREST PRODUCTS

Project Fact Sheet



MODEL-BASED DIAGNOSIS OF SOIL LIMITATIONS TO FOREST PRODUCTIVITY

BENEFITS

- Higher-yielding plantations and forests
- Enhanced efficiency of nutrient utilization by forests
- Shorter rotation time for plantations
- Waste minimization by use of sludge from sewage and paper waste streams as nutrient sources on forest land
- Enhanced soil carbon sequestration, providing carbon credits (Kyoto Protocol)
- Site-specific fertilizer management (precision forestry)
- Use of harvest residuals and nutrient amendments

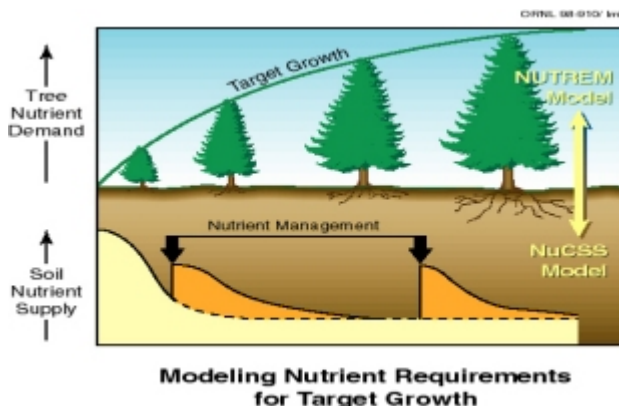
Modeling of Nutrient and Water Use by Trees Will Lead to Increased Yields from Plantations and Forests

Modeling the complex processes by which water and nutrients in soil are supplied to trees and used in growth will benefit forest managers. A number of physical, chemical, and biological processes in soil and plants interact with variable weather conditions to determine the supply of soil resources needed in tree growth. Forest-management options that achieve greater synchronization of soil resources and plant demand will enhance both the efficiency of resource utilization and the productivity of forests. Applying models to major forest types in the continental United States to determine appropriate management options will be widely beneficial to the forest products industry.

The increasing demand for wood products and the decreasing availability of public lands for timber cutting emphasize the need to increase forest productivity on private lands. The project involves experimental and modeling research conducted by Oak Ridge National Laboratory and forest industry cooperators. Modeling tools developed during the project will be made available to industry on an Internet web site for use in designing site-specific management options to overcome soil limitations to forest productivity.

APPLICATIONS

New opportunities will be identified for enhancing productivity of forests in diverse soil and climate conditions. High-yielding plantations on private lands will provide industry with the ability to meet the increasing demand for pulp and paper products. Sustainable forestry practices will be in place.



OFFICE OF INDUSTRIAL TECHNOLOGIES

ENERGY EFFICIENCY AND RENEWABLE ENERGY • U.S. DEPARTMENT OF ENERGY

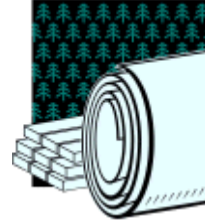
PROJECT DESCRIPTION

Goal: To determine options for enhancing soil quality and forest productivity of various commercial tree species in the continental United States by overcoming soil limitations to forest growth.

In this five-year study, investigators will use simulators to quantify the soil supply of water and nutrients and the utilization of water and nutrients in tree growth. They will examine the physical, chemical, and biological processes of soil in relation to the demand for water and nutrients simulated with forest growth models. Evaluations of alternative options for managing soil and forests to increase forest production will be conducted for the dominant commercial forest species and selected soil and climate conditions in the continental United States. These selections will be made in consultation with forest industry and collaborating universities. Data from ongoing and completed forest-productivity experiments involving fertilizer, nutrient amendment, and harvest residual treatments will be used in model testing. A new field experiment will examine enhanced plant establishment on soils of the western coastal plain in the southern United States. The project uses sensitivity and Monte Carlo analyses with the soil and plant models. This feature allows identification of statistically significant improvements in forest productivity due to forest and soil management in naturally varying field environments. The research will generate modeling tools for use by the forest industry to determine site-specific management protocols that enhance soil quality and sustainable forest productivity.

PROGRESS & MILESTONES

- Year 1: Soil types and models selected for further study; data assembled from field studies for modeling; hypotheses developed about soil factors limiting productivity.
- Year 2: Development of soil and plant models completed; field site selected for optimum-productivity and soil-amendment study; university and/or industrial collaborators chosen.
- Year 3: A new field experiment established; report completed on the testing and calibration of models.
- Year 4: Manuscript completed on model applications; field data collected for models.
- Year 4: Manuscript completed on model applications; field data collected for models.
- Year 5: Current findings from field studies summarized; regional assessment made of potential gains from soil treatments.



PROJECT PARTNERS

Oak Ridge National Laboratory
Oak Ridge, TN

North Carolina State University,
Department of Forestry
Raleigh, NC

U.S Department of Agriculture,
Forest Service
Scotland County, NC

FOR ADDITIONAL INFORMATION PLEASE CONTACT:

Sandra Glatt
Office of Industrial Technologies
Phone: (202) 586-3897
Fax: (202) 586-7114
e-mail: sandra.glatt@ee.doe.gov

Robert J. Luxmore
Oak Ridge National Laboratory
Phone: (423) 574-7357
Fax: (423) 576-8646
e-mail: rjl@ornl.gov

Please send any comments,
questions, or suggestions to
webmaster.oit@ee.doe.gov



Office of Industrial Technologies
Energy Efficiency and Renewable Energy
U.S. Department of Energy
Washington, D.C. 20585

August 1998